FEASIBILITY OF SPECIALTY CHEESE PRODUCTION IN MONTANA

THE OLD WEST REGIONAL COMMISSION

May 1980

OLD WEST REGIONAL COMMISSION

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May, 1980

NOTE TO THE READER:

The Old West Regional Commission funded a study in 1979 to determine the feasibility of producing European-type specialty cheeses in the State of Montana. The study was intended to evaluate both the technical and economic feasibilities of specialty cheese production as well as provide a methodology for further studies in other interested areas of the Region. The economic study was done by EPIC Research, Inc. and two site-specific technical studies were carried out by Manor Dairy International, LTD of Denmark (under subcontract to the Golden Triangle Area Development Corporation).

The studies show that it is technically feasible to produce specialty cheeses in the Old West Region. This report also shows that such a venture, if undertaken by an existing cheese plant, would provide a favorable return on investment. The reader should note, however, that prices and costs used in this study were those existing March, 1979. Since that time, conditions have changed - especially with regard to rising Montana milk prices. Thus the economic attractiveness has diminished, at least for the State of Montana. Although no licensing or marketing agreements between the Montana processors and the Danish cheese firm have been executed, it is hoped that the economic situation will eventually allow for the development of a specialty cheese facility in this Region.

The key factors regarding the feasibility of specialty cheese production include: an adequate and dependable supply of milk, production costs, selling prices of finished products, and location relative to markets. This study will hopefully be of value in allowing other states, firms, and/or individuals interested in this subject to analyze specialty cheese production potential, adjusting various costs and prices to their respective local conditions.

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Golden Triangle Area Economic
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For

Old West Regional Commission

Contract No. 10871285
804084

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INDUSTRY ANALYSIS

The production of natural cheese in the United States has undergone some significant changes in the past 30 years. Generally the number of plants has declined and average production per plant has increased. In 1950, there were 2,159 plants with an average production of 552,000 pounds per year. By 1973 there were 865 cheese plants with an average production of 3.1 million pounds per year.[1] This consolidation continues with the increase in plant size largely resulting from technological advances in production techniques and equipment. The only limiting factor appears to be the distance over which raw milk can be transported.

The number of plants producing over two million pounds annually has also increased significantly. This size plant represented only 9% of the total in 1957. The figure climbed to 14% in 1963 and reached 37% in 1972. The entire production of American type cheese in 1973 could have been produced in 53 plants of the larger type instead of the actual 592 plants involved in production in 1973.

The types of cheese produced in the United States have been growing in number over the past 30 years as well. Not surprisingly, the greatest percentage of production in this country is still American cheese. This cheese group includes: varieties of cheddar, colby, granular, stirred curd, washed

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[1] U.S., Department of Agriculture, Economic Research Service, The Cheese Industry, Agricultural Economic Report No. 294, July 1975, p. 12.

curd, and Monterey Jack. Cheddar now accounts for 78% of the American type cheese production. Cheddar has been and will probably remain the largest single product of the U.S. cheese industry.

The Italian type cheeses are the second largest distinctive group of cheese produced in the U.S. These include: Mozzarella, Ricotta, Provolone, Parmesan, and Romano. Approximately two-thirds of the production in this group is devoted to Mozzarella.

The production of American type cheeses has declined as a percentage of total production in the U.S. over recent years while Italian cheese types have shown a steady increase (Table 1-1). In 1975 American cheese types accounted for slightly less than 59% of the total production while the Italian types accounted for nearly 24%. Combined, these two groups represent 83% of the total U.S. cheese production. Quite clearly all other cheese types make up a small percentage of the total output in this country. The production breakdown of the remaining types is shown in Table 1-1.

TABLE 1-1

UNITED STATES CHEESE PRODUCTION

(Percentages)

Type	1968	1972	1975
American: whole	65.72	63.13	58.85
skim	.30	.31	.19
Swiss	6.69	6.82	6.18
Munster	1.49	1.75	1.85
Brick	1.08	.84	.70
Limburger	.14	.10	.07
Cream & Neufchatel	6.13	5.12	5.70
Blue	1.00	1.10	1.01
Italian	16.24	19.66	23.90
Others	1.21	1.17	1.54

SOURCE: Agricultural Statistics, United States Department of Agriculture, U.S. Government Printing Office, Washington, D.C. 1977.

The consumption of natural cheese in the United States has increased dramatically over the last 30 years, consistent with production trends. Per capita consumption of cheese rose from 7.7 pounds in 1950 to 17.7 pounds in 1977.[2] This represents an increase in consumption of nearly 230% over the 27 year period. Industry projections reflect a continued rise in cheese consumption in the future.

The variety of cheese types consumed by the American public have changed as well since 1950. While American cheeses still predominate, there has been an increase in the availability and consumption of other types. In the 1920's an average of 40 dairy items were available in retail stores. In 1975 there were over 200 cheese items on the shelves.[3] Another factor causing this increase in variety has been the appearance of national retail outlets effectively marketing many varieties of cheese. Two of the better known chains are Hickory Farms of Ohio with 433 outlets in 45 states and Swiss Colony Stores with 176 stores in 40 states.[4]

Generally, over the past 60 years the production of cheese has moved into the Western and the Southern areas of the United States.[5] Over this period procurement and production techniques have changed radically. The industry has moved from hand milking and wagon deliveries of milk to machine milking of large herds. Production facilities have changed from small kitchen

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[2]U.S., Department of Commerce, Domestic and International Business Administration, U.S. Industrial Outlook 1978, January 1978, p. 218.

[3]The Cheese Industry, p. 38.

[4]U.S., Department of Commerce, Franchise Opportunities Handbook, June 1978.

[5]"50 Years of Progress in the Cheese Industry. A Review," Walter V. Price, Journal of Milk Food Technology, Vol 34, No. 7, 1971, p. 329.

type plants serving a local area to large efficient capital intense plants producing millions of pounds of cheese in a year.

Wisconsin has long been the nation's largest producer of American type cheese. It is also the leading producer of the other major cheese types with the exception of Swiss. Wisconsin's share of total production has declined significantly in recent years, however. Minnesota, in particular, has markedly increased its production. This state has a much greater portion of large plants. Wisconsin, while having some new facilities, has retained many older and smaller facilities. Consequently, Wisconsin, while it still ranks first in overall production, ranks fifteenth in average plant size.

Table 1-2 summarizes the top twenty cheese producing states based on 1973 production statistics. If present trends continue, the states of Minnesota, North and South Dakota, Nebraska, and Iowa will supply an increasing amount of the nation's cheese in the future. These are states with good conditions for milk production and comparatively limited markets for fluid milk. Montana, in comparison, produces approximately three and one-half percent of the nation's cheese output or six million pounds annually and is not ranked among these top twenty.

The western states of Idaho and Utah are also significant to cheese production and rank sixth and tenth respectively. Their production continues to expand as well. Once again, these states are in the position of having large supplies of milk and a comparatively limited market for fluid milk.

Finally, the state of Oregon has developed a significant level of production of high quality American type cheeses, concentrated mainly in the Tillamook Valley region. This region has been successfully producing and marketing its products in the West for over 70 years. In fact, so successful is Tillamook as a brand name that it does no private label packaging. Every piece of cheese is sold as Tillamook cheese.

TABLE 1-2

LEADING STATES PRODUCING AMERICAN TYPE CHEESE - 1973

State	Total Production	Average Plant Production 1/
	1,000 pounds	
Wisconsin	720,104	2,686 (15)
Minnesota	24,560	13,646 (1)
Iowa	97,487	4,874 (2)
Missouri	71,834	3,991 (3)
New York	61,212	3,826 (5)
Idaho	50,794	3,175 (9)
North Dakota	50,794	3,132 (10)
Kentucky	47,216	3,935 (4)
South Dakota	45,298	2,831 (12)
Utah	36,592	2,614 (13)
Kansas	32,619	3,262 (8)
Nebraska	31,212	3,121 (11)
Tennessee	25,302	2,109 (17)
Oregon	20,844	3,474 (6)
Illinois	17,145	1,072 (20)
Indiana	16,840	3,368 (7)
Ohio	16,823	2,403 (14)
Michigan	14,538	1,454 (18)
Vermont	13,032	2,172 (16)
Washington	8,626	1,232 (19)
20 State Total	1,623,253	
U.S. Total	1,672,515	2,825

1/ Rank in average plant production given in parentheses.

SOURCE: U.S., Department of Agriculture, Economic Research Service, The Cheese Industry, Agricultural Economic Report No. 294, July 1975, p. 17.

CHANNELS OF DISTRIBUTION IN CHEESE PRODUCTION

Once natural cheese leaves the manufacturing plant it goes into one of four uses. Some is packaged into natural cheese. Other portions are made into processed cheese products. The remainder goes into industrial (e.g., frozen pizza) or institutional (e.g., cheeseburger) uses.

Assembly of cheese is a unique phase in the process following actual manufacture of the product. This generally involves the collecting and sorting of cheese into large uniform lots. In the past this was largely a function of private assemblers. However, increased vertical integration in recent years has reduced the number of levels through which cheese must pass to get to the market place. Large cheese processors now assemble most of their own cheese through a number of arrangements. Assembly at the manufacturing level usually is done by multiplant cooperatives, but national cheese companies (e.g., Kraft) are by far the largest first handlers of cheese. Very little first handling is done by nondairy food companies although they are ultimately the major users of both natural and processed cheese.

There are a number of functions which are usually performed at the intermediate distribution level. These are: cooling, testing for moisture and fat, grading, weighing, storage, transportation, cutting, and processing. Tests for moisture and fat content are used as a basis for pricing. Ageing is not generally done at the site of the manufacturer. Here, only enough cheese is accumulated for a shipment. This is due to the large capital investment required for storage facilities. Thus, seasonality in demand is usually dealt with at the intermediate level and not at the manufacturing level.

Cutting and packaging of natural cheese is done at all levels in the distribution system. These include the manufacturing plant, intermediate distributor, and foodchain warehouse. Cheese is generally cut into exact and uniform weights and packages or, cut, weighed, and wrapped in random packages of approximately the same size. Some national cheese companies primarily use their own labels while others label both for themselves and do private labelling for retail food chains. Cutting and wrapping at the retail level used to be very common. The practice declined sharply for a period but has once again gained favor with the growth of delicatessens in retail foods stores. The appearance of retail stores specializing in a wide variety of cheese types, such as Hickory Farms and Swiss Colony has also caused more cutting and wrapping to be done at the retail level.

The retail distribution of cheese is generally handled in a manner similar to the distribution of other food items. Brokers take orders from stores within an area. Some companies use a system of broker-distributors who handle both functions. The National Food Brokers Association listed 826 members in 1973 who dealt in dairy products, cheese, and margarine.[6]

Packaging of cheeses at the retail level has changed significantly in recent years. The advent of better and more efficient packaging machines has allowed more uniform high-quality portions to be made. These are easily displayed and do not generally lose weight in storage in the supermarket. These packages are generally made of heat sealed plastic as opposed to a mechanical closure used in the past.

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[6] The Cheese Industry, p. 38.

SPECIALTY CHEESE

The so-called specialty cheeses make up only a small part of the total U.S. cheese market. Apart from the American cheeses, these specialty types, which include Blue, Limberger, Brick, and Muenster, account for approximately 17% of domestic production. This 17% amounted to approximately 478 million pounds out of a total production of over 2.8 billion pounds in 1977.[7]

The other source of specialty cheese is imports. The main countries involved in this manufacture and export to the U.S. are: New Zealand, Denmark, Norway, Finland, France, and Austria. Others include: Italy, Czechoslovakia, Australia, Canada, Netherlands, Argentina, and Switzerland. New Zealand's share, however, has recently been declining due to energy/transportation problems. During the decade from 1965-1974 total imports steadily rose from 79.3 million pounds in 1965 to 315.6 million pounds in 1974.[8] This reflects a growing interest in these cheeses, many of which are only available as imports.

Cheese imports have been on the rise since the mid-1960's. During the 1950's and early 1960's, imported cheeses represented about 4.5% of domestic consumption.[9] By the mid-1960's imports had risen at a faster rate than consumer use. By 1968 imported cheese made up 8% of total

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[7]U.S., Department of Agriculture, Agricultural Statistics, Cheese Production by State, 1977.

[8]"Total U.S. Cheese Output Continuing at Recessed Levels," Robert J. Kiebs, American Dairy Review, November 1975, p. 34-C.

[9]"The Changing U.S. Cheese Industry," Robert R. Miller, Dairy Situation, DS-336, U.S., Department of Agriculture, Economic Research Service, July 1971, p. 32.

consumption. Some, but by no means all, of the increase was due to importation of low quality cheese for use in process cheese.

Imported cheeses are an important factor in the U.S. cheese market for two reasons. First, many of the specialty cheeses are available only through importation and consumer demand may be satisfied only in this manner. Second, the imported specialty cheeses are of high value and in some cases command more than twice the price of domestically produced cheddar (Table 1-3). These specialty products generate added income for those associated with its distribution.

TABLE 1-3

WHOLESALE AND RETAIL PRICES OF SELECTED IMPORTED SPECIALTY CHEESE

	CIF Wholesale West Coast (per pound)	CIF Wholesale East Coast (per pound)	Import Duty	Retail Price (per pound)
60% Cream Havarti	$ 1.45	$ 1.41	10%	$ 4.29
Tybo Caraway	1.35	1.31	10%	3.89
Esrom	1.37	1.33	10%	3.99
Danish Fontina	1.33	1.29	10%	3.49
45% Havarti	1.33	1.29	10%	3.89
Caraway Havarti	1.33	1.29	10%	3.89
Danish Blue	1.47	1.42	15-20%	4.29
Tybo	1.35	1.31	10%	3.89

SOURCE: The CIF Wholesale prices are prior to payment of duty and other import charges and brokerage fees and are from J. Hansen, Ltd., Aarhus, Denmark. The retail prices are from Hickory Farms of Ohio and reflect prices in Great Falls, Montana, Spring 1979.

The Hickory Farms of Ohio chain sells a significant amount of imported cheese through its nationwide chain of retail outlets. Their customers seem to prefer imported cheeses even when domestically produced

alternatives of the same type are available.[10] Any manufacturer contemplating domestic production of an imported cheese must be prepared to deal with this problem, for it may mean that a domestically produced specialty cheese may not be able to command quite the same price as the imported version.

Types of Specialty Cheese

Numerous varieties of specialty cheeses are available, many with extremely small shares of the total cheese market. Some of the better known types include: Jarlsberg, Havarti, Danbo, Fontina, Blue, Tybo, Esrom, and others. Many specialty cheeses have developed as a result of specific ethnic groups--people who have emigrated to the United States. These individuals desire cheeses from their native countries. This limited, ethnic related demand has been expanded considerably through sophisticated marketing techniques increasingly stressing varieties of cheese. Specialty cheese stores, which have increased in number, carry a wide variety of specialty or gourmet cheese types. The delicatessen setting, where tasting is encouraged, has been quite an effective way of exposing consumers to different varieties of specialty cheeses.

The channels of distribution of specialty cheeses are by no means unique. Specialty cheese is manufactured, assembled, and distributed in much the same manner as cheddar. The smaller quantities involved represent the only significant difference. Imported specialty cheeses generally go through wholesaler/importers who distribute to other

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[10]Personal communication with management of Hickory Farms of Ohio, Maumee, Ohio.

wholesalers or directly to retailers.[11] Some large retailers buy directly from exporters.

Cooperative sales agencies also play a significant role in distribution of imports. The Danish dairy industry for instance, maintains various sales offices in countries importing significant quantities of cheese and other products. These offices are actively involved in the promotion of the various cheese types. In addition, there are Export Boards which are involved in the setting of minimum prices, and exporters who are members of the board must adhere to the pricing standards.

As with American type cheeses, packaging of specialty cheeses occurs at all levels in the distribution system. Havarti, for instance, is in some cases packaged and labeled at the manufacturing plant and in other cases is cut and packaged by the retail outlet.

Specialty Cheese Demand

The per capita consumption of American produced cheese has shown a steady and long term increase, a trend which is also characteristic of specialty cheeses supplied primarily by imports. To better understand the demand for specialty cheeses, it is important to understand the demand characteristics of natural cheese as a consumer item. Several such characteristics are reviewed below.

First, there is a considerable amount of geographically influenced differences in household purchases of natural cheese. The Pacific region, for example, purchases nearly twice as much cheese per capita as does the

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[11] "Changes in the Processing and Distribution of Milk and Milk Products: A Challenge to Farmers," Vol 2: Danemark, United Kingdom, United States, New Zealand and General Report, Organization for Economic Cooperation and Development, Paris 1974, p. 60

South.[12] But the greatest market potential for natural cheese continues to be the Northeast and North Central regions of the U.S. with the highest concentration of households. Other market areas, such as the Pacific Northwest, are developing with population growth and per capita consumption trends and should provide significant market potential in the future.

The degree of urbanization is also known to effect cheese consumption. The greater the urbanization, the higher the household consumption rate. Over 60% of the natural cheese marketed in the U.S. is sold in cities of a half a million population or over.[13]

Family size also plays a role in cheese consumption. Families of 1-2 persons purchase as much natural cheese as do families of 6-7. The same differentiations can be made by occupation. White collar workers tend to be better purchasers of natural cheese than do blue collar workers.

Interestingly enough, income is not as important as geographical location, family size, age, and other elements in defining affinity to the rate of purchase of cheese. The purchase of processed cheese of which is characteristically lower priced than natural cheese, varies as much with income levels as does the purchase of natural cheese.

Specialty cheese which is higher priced than the American varieties will be more sensitive to income levels than the majority of natural cheeses. These cheeses constitute only a small percentage of total U.S. cheese market, but their distribution is increasing. Supermarkets which previously have offered only precut and packaged cheeses are now

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[12]"The Household Cheese Market," American Dairy Review, Manufactured Milk Products Supplement, March 1975, p. 58-D.

[13]Ibid.

complimenting this with a delicatessen counter where a wide variety of cheese types is displayed which can be cut and wrapped to order.

The demand for high quality specialty cheeses can be expected to remain strong. Well planned and executed marketing programs by retail outlets coupled with increased availability will account for this in large part. The so-called "snob appeal" of imported specialty cheeses may also be a factor although this is difficult, if not impossible, to measure. This factor is known to have contributed significantly to the success of the American wine industry's expansion where smaller producers became successful with high value premium wines by appealing to the "elite" consumer. Later, large producers, who in the past had made only low cost table wine, began producing and successfully marketing premium wines. Should specialty cheeses gain a larger share of the total market supported by imports or small local operations, it is conceivable that this would generate a response from the large national cheese companies.

Foreign Cheese Production Costs

Five major factors are known to effect the cost of producing and exporting cheese to the U.S. from foreign countries. These are: (1) labor and overhead costs, (2) raw milk costs, (3) import duties, (4) freight costs, and (5) currency exchange rates. These factors must be analyzed individually before being combined to determine their effect on foreign cheese production, export and competition with U.S. produced cheeses.

Labor and overhead costs of cheese production in Europe are a significant factor effecting the cost of products exported to the United States. This is particularily true of the Scandinavian countries where an increase in the number of social welfare programs and government regulations has caused labor costs to greatly increase in recent years. This

has predictively caused cost of production and product price to increase. New Zealand is still quite competitive with its labor costs, however, particularly at the producer level due to ideal milk production conditions.[14]

Raw milk costs probably have more effect on cheese costs than any other single item. European milk costs are generally higher than those in the United States. When expressed in dollars per hundredweight, typical of U.S. pricing, European milk costs have run as high as forty (40) to fifty (50) percent over raw milk costs in sections of the U.S. in recent years. New Zealand, which does not have high milk prices at the present time, remains competitive.

Import duties also play a major role in effecting the price of imported cheeses. As noted in Table 1-3, the regular duties on these cheeses range from 10% to 20%. There is also a counterveiling duty statute--section 303 of the Tariff Act of 1930 as amended by the Trade Act of 1974.[15] This allows the Secretary of the Treasury to involve a counterveiling duty on a product if it is determined that the product is receiving a bounty or grant from a foreign government or agency. Until January 2, 1979, the Secretary could waive this duty at his discretion. This was to prevent interference with trade negotiations in Vienna, which were in progress at that time. A concession was usually negotiated prior to granting of a waiver, which usually took the form of a reduction in subsidies being paid foreign manufacturers. Waivers were granted for all cheese imports during this period, but the negotiation process effectively held down the subsidies.[16]

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[14]"New Zealand Staggers from Two Hard Blows to its Economic Base," Wall Street Journal, January 22, 1979, p. 1.

[15]"Total U.S. Cheese Output...," p. 34-C.

[16]Personal conversation with M. Olbrich, Import Specialist, U.S. Customs Information Exchange, New York.

The provision allowing the Secretary to waive counterveiling duties expired on January 3, 1979. From then until an extension was passed on March 27, 1979, counterveiling duties were collected. This added up to 50¢/lb. to the cost of imported specialty cheeses. The extension period will last until September 30, 1979, at which time a new trade agreement is expected to be completed. If approved, the counterveiling duty provision will be such that injury to domestic producers will have to be shown before the duty can be invoked.

Currently there are four types of quotas effecting imported cheeses. These vary according to the type of cheese and country of origin, but include:

1. Cheese types where a license (permit to import a specific amount) is always required.

2. Types where quota is dependent on price. If above a price based on the domestic cheddar price, no license is required. If below, a license is required.

3. Type requiring no license--sheep and goat's milk cheese.

4. One and a quarter million pounds from Canada annually.

If a new trade agreement is approved in September, all cheese, with very few exceptions, will be required to have an import license. This is not expected to have a stifling effect on cheese importation, however, as long as demand remains strong.

The cost of ocean freight is always a factor with imported products. Specialty cheese, as a high value product, is less effected than lesser value products. The long term energy problems, which are just beginning, may well cause a significant and sustained increase in the cost of this type of transportation, however.

The final factor relating to the cost of imported cheeses and their competitive advantage or disadvantage against U.S. produced cheeses is the purchasing power of the U.S. dollar. This has declined severely in relation to most European currencies over the past few years and has caused the price of products imported from Europe to rise sharply. The dollar decline has also caused many European manufacturers to begin producing products in the U.S. to supply markets they have developed over the years. The most familiar example of this is the Volkswagon.

Summary

Of the five factors mentioned, the two most important are the cost of production in European (particularly Scandinavian) countries and the currency exchange rate. These are having a significant effect on the costs of imported cheeses. Should the exchange rate remain as it is now for a long period of time, it would appear that there is an economic incentive for foreign cheese manufacturers to produce their products in the U.S., especially where markets and channels of distribution may already exist.

The purpose of this report is to analyze the feasibility of producing European-type specialty cheese in Montana for distribution through established marketing channels under license or contract with a foreign cheese firm. The study will reveal: (1) the geographical locations within the State of Montana where an ample supply of milk suited for cheese making now exists, and (2) the profit margins which may be realized from the production of one or several types of cheese.

Several assumptions have been made in this study with respect to the production, marketing and investment alternatives associated with the production of European cheese types. First, it has been assumed that the technology for making these specialty cheese varieties is available from a

foreign cheese firm under a licensing agreement. It is expected that the necessary technology will be transferred to a Montana facility if the venture is feasible and satisfactory licensing or contract agreements can be negotiated.

Second, it has been assumed that these specialty cheeses will be marketed through established wholesale channels with selling agreements negotiated with the foreign cheese firm which licenses the production of these cheeses in the state. As such, packaging of the products may be under established trade names with identification of U.S. origin of production. Prices used throughout the study will be based on quality of product and will be competitive with imported cheese.

Finally, it is assumed in this study that production of any of these cheese types will occur in either: (1) an existing cheese plant with suitable cheese making equipment and storage capacity or (2) an existing milk plant with a suitable cottage cheese vat which can be utilized in the making of specialty cheese. Investment costs therefore will be minimum and will reflect primarily the added costs of special equipment to produce, package and distribute these cheese types. The feasibility of the project will be judged only in the context of improving the operating performance of existing, suitable plants.

MILK PRODUCTION AND UTILIZATION IN MONTANA

The Montana dairy industry represents an important segment of Montana agriculture. By year-end 1977, cash receipts from dairy farm products exceeded those from sheep and wool, hogs, sugar beets, and other cash crops excluding wheat and barley.[1] At a total value of $27 million, dairy marketings ranked fifth behind cattle and calves, wheat, barley, and hay. Total receipts had grown from $16 million in 1970 at an average annual rate of 7.8 percent, slightly in excess of the 6.8 percent annual rate of growth for cash receipts from all farm commodities. Preliminary data for year-end 1978 indicated continued growth at this same rate.

The dairy industry is unique among all segments of Montana's agriculture in two respects. First, the industry is integrated to the extent that nearly all farm production of milk is processed and utilized within the state. The value added in processing and distribution is contained largely within the state, adding employment and income that would otherwise be lost if production were exported out of state. Milk is processed and sold in Montana as fluid milk, ice cream, cottage cheese, cheddar cheese and butter.

The industry is also unique in that it is state regulated, primarily with respect to price at retail, wholesale and producer levels. This has

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[1]Montana Department of Agriculture and Montana Crop and Livestock Reporting Service, U.S.D.A., Montana Agricultural Statistics, Vol. XVII, December 1978, p. 12.

the obvious disadvantage of raising public concern as to whether or not various segments of the industry operate with maximum efficiency. However, it has the advantage of removing uncertainty about price and contributing toward stable growth in production and cash receipts. The alternating "peaks" and "valleys" in both production and price of farm commodities are not nearly as exaggerated in dairy marketings as in other commodity categories.

The Montana dairy industry has undergone several changes over the past eight years. Primary among these has been the institution of a new milk control law (27-407, R.C.M. 1947), as amended by Chapter 107 of the laws of 1971, which became effective on July 1, 1971. Under the provisions of this law, the Board of Milk Control was vested with the duty and authority to designate natural marketing areas within the state for milk and milk products and to prescribe and enforce minimum producer, wholesale, and retail milk prices in these areas by means of flexible economic formulas.

The marketing areas designated in 1971 are summarized in Figure 2-1. Four markets may be classified as "major" areas within the state with a combined volume of milk production representing approximately 75 percent of total production statewide. These are: (1) Missoula, (2) Bozeman, (3) Billings, and (4) Great Falls. Five other areas provide the balance of statewide milk production: (1) Kalispell, (2) Butte, (3) Helena, (4) Havre, and (5) Glendive. Milk plants in other areas across the state have closed since 1971 as indicated.

Three classes of milk were defined in the Milk Control Division Laws of 1971, as follows:

> CLASS I MILK shall include all bottled or packaged milk, low-fat, buttermilk, chocolate milk, whipping cream, commercial cream, half-half, skim milk, fortified skim milk, skim milk flavored

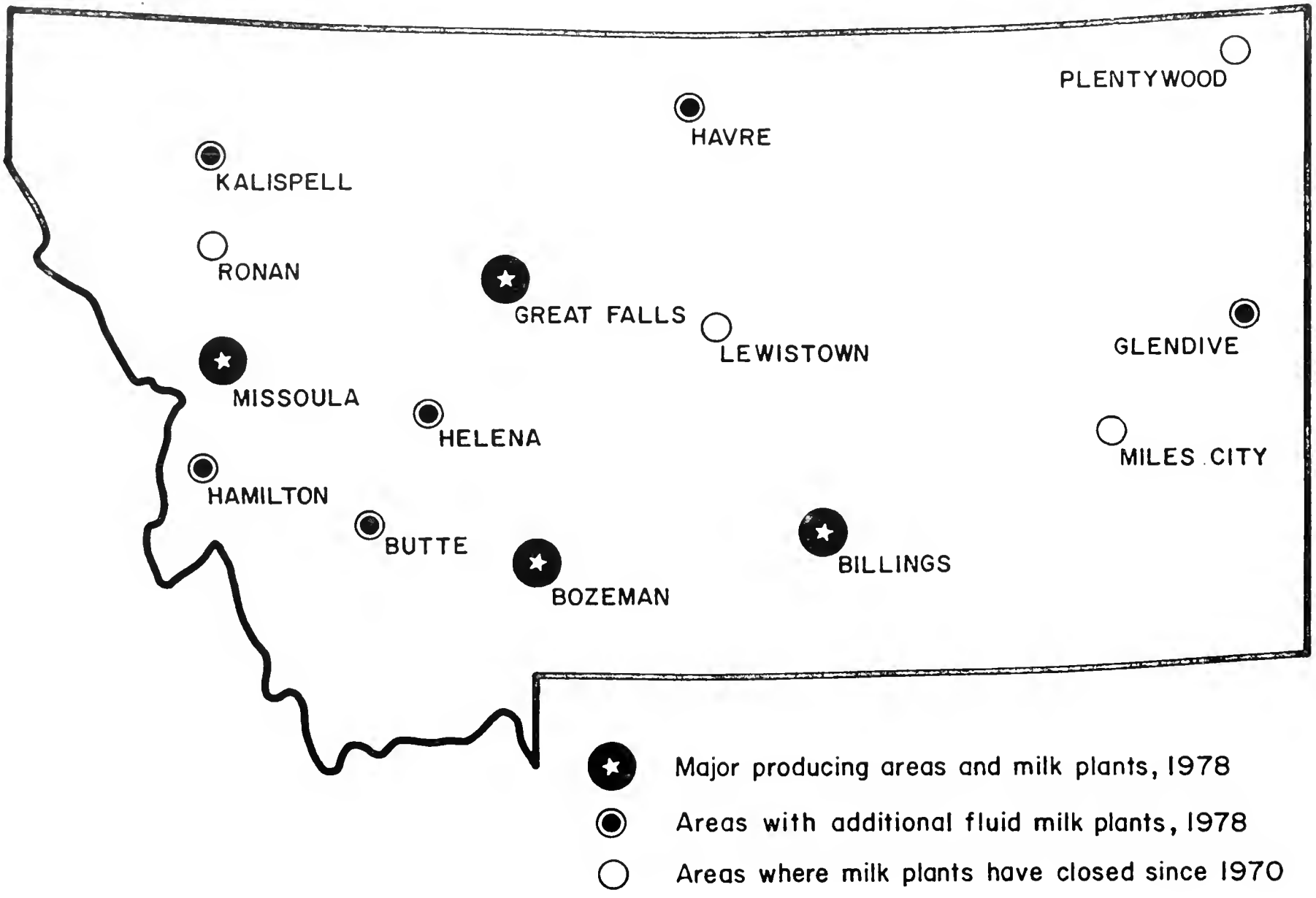

FIGURE 2-1: MILK MARKETING AREAS IN THE STATE OF MONTANA

drinks, and any other fluid milk not specifically classified in the Act, whether raw, pasteurized, homogenized, sterile or aseptic.

CLASS II MILK shall include milk used in the manufacture of ice cream and ice cream mix, ice milk, sherbert, eggnog, cultured sour cream, cottage cheese, condensed milk, and powdered skim for human consumption.

CLASS III MILK shall include milk used in the manufacture of butter, cheddar cheese, processed cheese, livestock feed, powdered skim other than for human consumption, and skim milk dumped.

The Board was empowered to fix minimum producer, wholesale, jobber, and retail prices for Class I milk and minimum producer prices only for Class II and Class III milk in all areas of the state. The Board was to adopt flexible economic formulas which were devised so that they brought about automatic changes in all minimum prices as were justified on the basis of changes in production costs and supply, processing and distribution costs, and retailing costs. Flexible economic formulas were adopted for the regulation of Class I milk in May 1972. Formulas were adopted to regulate Class II and Class III milk prices the following month (see Appendix A).

Since the implementation of "formula pricing," the minimum producer Class I milk price has increased at an average rate of approximately 8½ percent per year to a level of $11.71 per hundredweight on March 1, 1979 (Figure 2-2). Class II prices have increased at an average annual rate of approximately 10 percent and Class III prices have increased at an average rate of 11½ percent per year. Effective March 1, 1979, the Class II and Class III minimum producer prices stood at $10.17 and $8.66 per hundredweight, respectively.

Several other changes have occurred in milk production and utilization in Montana since the early 1970s as well. These are summarized in Table 2-1

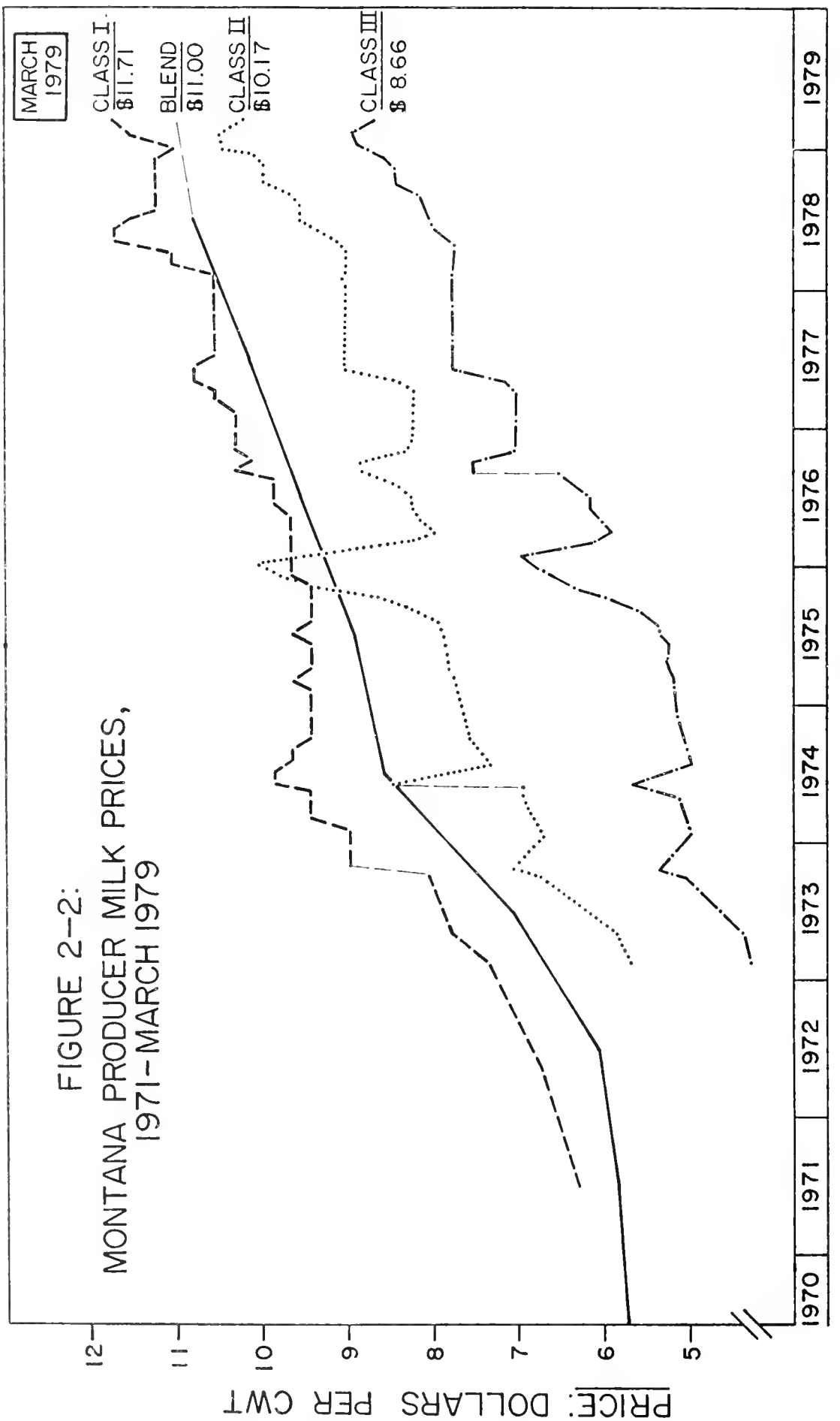

FIGURE 2-2:
MONTANA PRODUCER MILK PRICES,
1971-MARCH 1979

TABLE 2-1

MILK PRODUCTION & UTILIZATION STATISTICS

STATE OF MONTANA
(1970-1977)

	1977	1976	1975	1974	1973	1972	1971	1970
GRADE A MILK PRODUCTION								
Sold to Montana Processors (1000 lbs)	244,386	226,636	222,095	217,274	227,190	234,438	227,001	220,415
Number of Cows	21,692	20,524	19,999	19,900	20,145	20,698	20,370	20,266
Production Per Cow	11,266	11,041	11,105	11,382	11,427	11,327	11,114	10,876
Number of Licensed Producers	282	271	261	262	303	310		
PRODUCER MILK UTILIZATION								
Class I	74.70%	78.00%	77.74%	74.93%	73.02%	72.87%	72.71%	72.00%
Class II	12.72%	12.48%	12.80%	13.32%	15.91%	16.07%	15.87%	14.37%
Class III	12.58%	9.52%	9.46%	11.75%	11.07%	11.06%	11.42%	13.63%
GRADE A MILK IMPORTED FROM OUT-OF-STATE (1000 lbs)	15,690	12,106	13,108	13,804	13,191	11,237	12,572	11,056
GRADE A MILK PRODUCED AND SOLD ON-THE-FARM (1000 lbs)	2,089	2,070	2,415	2,428	2,313	2,357	1,845	2,101
CLASS III USAGE (1000 lbs)								
Cheddar Cheese	6,291	6,681	7,030	17,208	19,258	21,151	23,647	24,211
Butter	1,028	842	1,458	1,492	2,060	2,469	2,430	2,488
Bulk Sales - Independent Cheese & Butter Plants	14,236	6,961	5,788	5,929	5,861	4,423	4,141	4,240
Bulk Sales - Out-of-State	6,095	6,255	6,877	1,458	369	241	648	NA
AVERAGE BLEND PRICE ($1 cwt)	$10.14	$9.58	$8.88	$8,58	$7.07	$6.05	$5.81	$5.69

SOURCE: Annual Report of Milk Utilization in Montana, Milk Control Division, Montana Department of Business Regulator - 855 North Main, Helena, Montana 59601

covering the period 1970 through 1977. Grade A milk production which is sold to various milk processing plants in Montana has increased by approximately 11 percent from 220 million pounds in 1970 to 244 million pounds in 1977. During this same period, there has been a 7 percent increase in number of Grade "A" dairy cows in Montana and approximately a 3.6 percent increase in annual milk production per cow. These production increases have occurred even in the face of a general decline in the number of licensed producers operating in the state.

The utilization of milk produced in Montana between Classes I, II, and III has also changed substantially since 1970. With the exception of 1977, there has been a steady increase since the early 1970s of milk utilization in Class I. This has been combined with a decrease of milk utilization in Class II and Class III. By the end of 1976, 78 percent of all milk produced in Montana was utilized in Class I, 12½ percent in Class II, and 9½ percent in Class III.

In 1977, a sharp increase occurred in the production of Grade A milk sold to Montana processors. An additional 18 million pounds were produced over the production of the previous year. The bulk of this was channeled into Class III utilization. Only half of the increased production was able to be utilized in Class I or Class II. Thus, a significant drop occurred in Class I utilization and a significant increase occurred in Class III utilization statewide. At the end of 1977, 74.7 percent of all milk was utilized in Class I, 12.7 percent in Class II, and 12.6 percent in Class III.

The milk price and utilization changes over the past eight years combined have resulted in an average "blend price" paid to producers for milk sold to Montana processors of approximately $11.00 per hundredweight

by year-end 1978. This represents an increase of approximately 8.7 percent per year from $5.69 in 1970. A significant jump in milk prices was recorded in Class I in November 1973 when the Class I formula was revised. A significant jump was recorded in Class II price when Class II formula was revised in June of 1974 and a significant increase occurred in the Class III price when the Class III formula was revised in September of 1976 (see Appendix A). A steady upward trend continued in producer milk prices in Montana into 1979.

Each year, the Milk Control Division of the Department of Business Regulation publishes a report of milk utilization in Montana outlining in detail production, utilization, and milk prices. Table 2-1 summarizes some of the more significant production and utilization statistics statewide since 1970. In addition to producer milk, some Grade A milk is imported annually from out of state. This amount has averaged approximately 13 million pounds annually since 1971, representing approximately 5½ percent of total. The statistics available from the Milk Control Division of the Department of Business Regulation indicate that this imported milk has been used almost exclusively in Class I, averaging over 95 percent during the past seven years.

In addition to milk produced in Montana and sold to Montana processing plants, a small amount of milk is produced by "producer-distributors" and sold on the farm. Between 2.0 and 2.4 million pounds annually have been produced in this manner over the past seven years. Traditionally, this milk has been used in Class I and Class III with today's percentage distribution equaling 90 percent Class I and 10 percent Class III.

Class III milk useage is particularly important in this study. Statistics collected and reported since 1970 indicate that cheddar cheese

production by Montana processors has declined significantly from 24 million pounds in 1970 to approximately 6 million pounds in 1977. Milk used in the production of butter by these plants has declined from approximately 2.5 million pounds in 1970 to 1.0 million pounds in 1977. However, milk sales to independent cheese and butter plants has increased by 10 million pounds over this same period, partially offsetting the decline in butter and cheese production by the licensed and regulated Montana processing plants.

Of particular significance to Class III milk utilization, however, is the fact that bulk sales out of state of Class III milk has increased from practically nothing in the early 1970s to over 6 million pounds annually for the past three years. It would therefore appear that a surplus of Class III milk exists statewide suited to the manufacture of cheese in Montana. This observation is examined in greater detail in the sections which follow dealing with selected milk marketing areas in the state.

MILK PRODUCTION AND UTILIZATION BY MARKET AREAS IN MONTANA

The Board of Milk Control originally designated twelve market areas for milk production and utilization in Montana. Three of these areas previously designated as (1) Miles City, (2) Plentywood, and (3) Lewistown no longer exist. Miles City and Plentywood producers now ship to processors in the Glendive market area while producers in the Lewistown area now ship to processors in Great Falls.

Appendix B contains several tables outlining in detail milk production, utilization and price in the surviving nine market areas in the state. Table B-2 summarizes total milk production by market area from 1970 through 1977 while Table B-3 reflects market share for each market area in the state

over the same period of time. Four of the nine market areas account for approximately 75 percent of all milk produced in the state. These include Missoula with approximately 24 percent, Great Falls with approximately 15 percent, Bozeman with approximately 18 percent, and Billings with approximately 17 percent. The five other areas of Kalispell, Butte, Helena, Havre, and Glendive account for the remaining 25 percent of statewide milk production.

Several changes in milk production, utilization and price have occurred within the various market areas across the state over the past nine years. In addition, the number of licensed dairy processing plants has declined since the early 1970s with the result that the processing and distribution of milk in the state is concentrated in the hands of efficient operators today. In the paragraphs which follow, the potential for processing fine cheeses within selective market areas of the state is evaluated in terms of milk supply, utilization and price.

Kalispell Market Area

Milk production in the Kalispell area has remained stable over the past nine years at approximately 19 million pounds annually representing between 8 and 9 percent of total statewide production. Within this market area are located two milk processing plants: Skyline Dairy, an independent company; and Equity Supply Company, a cooperative. These plants process a variety of Class I, Class II, and Class III products with Class I or fluid milk production accounting for approximately 80 percent of total by year-end 1977.

Traditionally, the blend price per hundredweight of milk in the Kalispell makret area has averaged slightly below the statewide blend

price. This has resulted primarily from the fact that a larger percentage of Class II and Class III products have been produced in this area than across the state as an average. Class III total production, however, has decreased since 1973 while Class I production has increased substantially. The latest available data (Appendix Table B-5) indicates that slightly over two million pounds or 12 percent of the milk available in this area is being utilized in Class III, the bulk of which could probably be directed into the production of fine quality cheeses, especially if the area "blend price" is offered for this milk.

Missoula Market Area

The Missoula area traditionally has provided between 23 and 25 percent of the total milk production in the state of Montana. This market area includes nearly all milk producers west of the Continental Divide, with the exception of those in the extreme northern portion of the Flathead Valley (Kalispell, Montana) or the southern portion of the Bitteroot Valley (Hamilton, Montana). Traditionally, a much lower proportion of milk has been utilized in Class I in this area than in other areas across the state with a relatively large and stable proportion of milk being used in Class II products (primarily ice cream and cottage cheese). As a result, the average blend price of milk in this market area has remained between 25 and 40 cents per hundred weight below the statewide average.

Within the Missoula market area, several changes have recently occurred with milk processing plants. In the early 1970s, three plants were located within this area: (1) Beatrice Foods, one of three Beatrice plants in Montana, (2) Medo Land Dairy, an independent, and (3) Consolidated Dairies of Ronan, Montana, a co-op. In 1974, Medo Land Dairy was purchased

by Consolidated Dairies of Ronan and continued to operate as a fluid milk processing plant using the Darigold label. By the end of 1978, this plant as well as the Consolidated Dairies plant in Ronan had essentially closed and all milk previously handled by these plants was being shipped into the Spokane market area where it was processed into fluid products for return distribution in Western Montana.

In 1976, the Ravalli County Creamery in Hamilton, Montana, was purchased by Mr. Dave Hulls, a Hamilton area dairy producer. By year-end 1978, Mr. Hulls had expanded the Hamilton plant (Hamilton House Dairy) in order to manufacture a wide line of fluid milk products as well as ice cream and cheddar cheese (principally a raw milk cheese). Several of the Missoula area dairy producers had contracted to sell milk to the Hamilton House Dairy instead of selling to Spokane markets as they had in the past.

Among all market areas in the state of Montana, the Missoula area has traditionally contained the largest volume of milk utilized in Class III (see Appendix Table B-5). By year-end 1977, over eight million pounds of milk was being utilized annually in this class and much of this milk was being shipped out of state rather than processed into products in the state. The cheese-making facilities at the Hamilton House Dairy were carefully evaluated with respect to the manufacture of fine quality cheeses in Montana with the result that this plant was selected as one of two in the state of Montana for a detailed technical evaluation of fine quality cheese production.

Butte Market Area

The Butte market area contains the Safeway Stores, Inc., Dairy which primarily processes fluid milk for distribution to Safeway Stores

across the state of Montana. This has resulted in a high Class I utilization and a "blend price" paid for milk in the Butte market area of approximately 30 to 50 cents per hundredweight higher than the statewide average. Only a small volume of milk is available for Class III production within this market area.

Great Falls Market Area

The Great Falls market area represents one of the four major market areas in the state. Total milk production within this area has increased from approximately thirty million pounds in 1970 to approximately thirty-seven million pounds in 1977. Only a small amount of this increase, however, has been directed into the production of Class I or fluid milk products. Class I utilization in the Great Falls market area has decreased from 86 percent of total in 1970 to 74 percent of total by year-end 1977. The bulk of the increased production over the seven-year period was directed into Class III utilization with the result that approximately six million pounds of milk had become available for production in Class III by year-end 1977.

The blend price paid to producers in this market area has declined from a 50 cent premium above the statewide average in the early 1970s to only a few pennies above the statewide average by the end of 1977. In the absence of seasonal shortages of milk for Class I utilization, milk would appear to be available in the Great Falls market area for production of fine quality cheeses, provided that a high enough price can be paid for this milk to uphold the blend price being paid for milk in the market area.

Three milk processing plants have operated in this market area over the past ten years. These include: (1) a Beatrice Foods plant, (2) a Darigold Farms plant (a co-op plant part of Darigold Farms of Bozeman), and the

Ayrshire Dairy (an independent plant which merged with Vita-Rich Dairy of Havre in 1976). Currently, the Darigold Farms plant is strictly a fluid milk bottling plant. The Beatrice Foods plant operates to process fluid milk products as well as ice cream and cottage cheese. The Ayrshire Dairy is inactive at the present time and operates only as a distribution point for Vita-Rich of Havre. In evaluating the facilities and the interest on the part of dairy processors in this market area, it can be concluded that some potential does exist for the future development of fine quality cheese production in this portion of Montana.

Bozeman Market Area

The third market area in the state with current potential for the processing and distribution of fine quality cheeses in Montana is the Bozeman market area which accounts for approximately 18 percent of total milk produced in the state, second only to the Missoula market area. Milk produced in this market area has traditionally been utilized in cheese production as well as in production of Class I and Class II products. In the early 1970s, the Darigold Farms plant produced cheddar cheese as did Glacier Mountain Cheese located along the West Gallatin River in the central part of the valley. Darigold Farms, however, discontinued the manufacture of cheddar cheese in 1973 due to rapidly increasing labor costs and producer prices for Class III milk. Declining profit margins realized from cheddar cheese sales ultimately forced the discontinuation of this product line.

Milk continues to be available in the Bozeman market area for Class III utilization, particularly during seasons of the year when fluid milk production declines. Occasionally, milk is shipped out of state to

cheese plants in Idaho where prices are sufficiently high to pay the added cost of hauling.

Apart from the Glacier Mountain Cheese plant located in the Gallatin Valley, the Darigold Farms plant is the only remaining dairy plant in this area. Jersey Creamery closed its plant in the Bozeman area in 1972, concentrating all production and distribution in Southwestern Montana out of its Billings plant. Both the Darigold Farms plant and the Glacier Mountain Cheese plant possess facilities suitable to the manufacture of fine quality cheeses within the state with Darigold Farms, in particular, possessing an adequate supply of extremely fine quality milk provided by Grade A producers in the valley. For this reason, Darigold Farms was selected as the second plant within the state of Montana for a detailed technical evaluation of the feasibility of producing fine quality cheese.

Billings Market Area

The most rapidly expanding market area for milk production and utilization in the state of Montana is in Billings where milk production has grown from twenty-five million pounds in 1970 to approximately forty million pounds in 1977. This large increase in milk production has been primarily utilized in Class I and Class II production. Class I production alone reached 91.5 percent of total by year-end 1976, reflecting the increased demand for fluid milk products resulting from population increases in the Billings and the southwestern portions of Montana.

The average blend price for milk in the Billings market area is second only to the Butte market area, resulting from an unusually high utilization in Class I. Two fluid milk plants operate in the Billings area, a Beatrice Foods plant and a Jersey Creamery plant. The increasing

demand for milk in fluid products during all but the summer months of the year precludes the feasibility of acquiring a steady supply of milk for fine quality cheese production at the current time. In addition, the price which would have to be paid to attract milk into this use is higher than elsewhere within the state due to the competition of high Class I utilization and producer milk prices.

Other Market Areas

The three remaining market areas in the state of Montana--Helena, Havre, and Glendive combined--provide approximately 11 percent of the milk utilized within the state. One milk processing plant exists in each market area. In Havre, Vita-Rich Dairy serves primarily as a fluid milk plant with some production in Class II. Less than 4 percent of the milk in the Havre area is available for Class III utilization annually.

In the Helena market area, Clover Leaf Dairy, an independent, produces a full line of fluid milk products and some products in Class II. The Helena market area is the smallest in the state with approximately 2½ percent of total state production and utilization. Essentially, no milk is available in this area for the production of fine quality cheeses at this time.

At the extreme eastern edge of the state of Montana, the Glendive market area has changed over the past ten years to include today the producers located in the Plentywood area and the Miles City area. Dairy processing plants in these two areas have closed over the past eight years. In the Glendive area, Gate City Dairy is the only remaining milk processing plant in Eastern Montana. Class I utilization has declined over the past nine years with an offsetting increase in Class III utilization. At the

end of 1977, slightly over 20 percent of total milk production in this area was utilized in Class III. However, this amounted to less than two million pounds, which is judged inadequate for sustained production of fine cheese.

SUMMARY

Milk to be utilized in the production of fine cheese in Montana falls within the Class III category. While this classification has traditionally accounted for only 11 percent of all milk produced in the state of Montana, it does account for somewhere between twenty-five and thirty million pounds of milk production annually. A minimum of five million pounds of milk would be required annually for the efficient production of any of the fine quality cheeses currently being produced in Europe and exported to markets in the Pacific Northwest. It was therefore determined that an evaluation of the technical feasibility of producing the fine quality cheeses in the state of Montana would have to be confined within market areas where at least five million pounds of milk can be provided annually for the production of these cheeses.

The three market areas in the state with the greatest availability of Class III milk and the potential to provide an adequate supply of milk for fine cheese production include Missoula, Great Falls, and Bozeman. Within the Missoula and Great Falls market areas, Class I utilization of milk has remained stable since the early 1970s. It would appear that the Class III milk which is currently available in these two market areas will continue to be available in the future for the production of fine quality cheese.

In the Bozeman market area, Class I utilization has increased to offset a decline in Class III utilization since the early 1970s. However,

The Bozeman market area continues to provide a significant amount of milk utilized in Class III and ranks second behind Missoula. Existing processing facilities would easily lend themselves to the production of fine quality cheeses in this area, as well. Technical feasibility studies were therefore conducted in the Bozeman area together with Darigold Farms and in the Missoula area with the Hamilton House Dairy of Hamilton to further evaluate the feasibility of producing fine quality cheeses in Montana.

PRODUCTION ANALYSIS

The technical feasibility studies furnished by Manor Dairy Ltd., of Aarhus, Denmark identified five cheese types which could be produced in existing Montana plants. These included: (1) 45% Havarti, (2) 60% Cream Havarti, (3) Jarlsberg, (4) Svenbo, and (5) Baby Swiss. The Havarti cheeses were grouped as one type since their production required different equipment than that required in the production of the other three products.

Two of the above cheese types, 45% Havarti and Jarlsberg were selected in a technical study for detailed production analysis. These were selected for several reasons. First, they represented the types of cheese best suited to the cheese making facilities available in the state. Second, they represented the types of cheeses best suited to a startup operation of producing European cheeses. Finally, it was pointed out by Manor Dairy Ltd., that strong markets for these two cheese types already exist in the United States, having been created by imports over the past several years.

Table 3-1 summarizes the characteristics of the two cheese types discussed in the study. It was suggested that the 45% Havarti cheese be produced in five kilogram (kg) blocks, equivilent to approximately eleven pounds each. The Jarlsberg cheese was to be produced in fifteen kg blocks equivilent to approximately thirty-three pounds. Either of these two cheese types could be cut and wrapped after aging into small packages adapted to consumers' normal purchase patterns.

TABLE 3-1

CHARACTERISTICS OF CHEESE TYPES

	45% Havarti	Jarlsberg
Texture	semi-soft, flexible, rindless	firm for cutting, flexible, rindless
Shape/Size	rectangular, loaf-shaped 11 lbs./5 kg.	square shaped 33 lbs./15 kg.
Color	regularly pale yellow to yellow	regularly pale yellow to yellow
Construction	regular place of eyes, eyes of irregular shape and of size like grains of rice	regularly placed, regular eyes with a diameter between 1/2 inch and 1 inch
Flavor	mild, subacid and aromatic	mild, rich and aromatic (nutty)
Fat in Dry Matter	minimum 45% suggested 48%	minimum 45% suggested 48%
Moisture	44%	44%
Salt	approximately 1.6%	approximately 1.6%

It was the recommendation of Manor Dairy Ltd., that startup operation be geared to the production of one vat of cheese per day, five days per week, fifty weeks per year. The recommended size of the cheese vat was approximately 22,000 lbs. (10,000 kgs). Based on probable yield calculations and allowing for one percent waste and one percent misproduction, this would amount to the yearly production of approximately 545,600 lbs. This level of production would require approximately 5.5 million lbs. of milk per year or 12,800 gallons per week. The production process was adjusted to the daily production of one vat of cheese based on the assumption that a continuous pattern of selling can be established.

In interviews with the management of Darigold Farms in Bozeman and Hamilton House Dairy of Hamilton it was determined that this quantity of milk could be supplied for the production of European type cheeses if profit margins were adequate to allow raw milk to be purchased on a competitive basis within these milk marketing areas. In order to assure that milk could be supplied five days a week, fifty weeks per year for the production of these cheeses, it was evident that a price closely approximating the average "blend" price would have to be paid for such milk due to competition primarily from fluid milk products, cottage cheese, and ice cream. A suggested pricing formula for specifying the value of raw milk in production cost calculations is contained in a subsequent section of this report.

PRODUCTION PROCESS

The production of fine European cheeses is extremely labor intensive. The cheese vat is required for approximately two and a half to three hours during which time the cheese must be cut and stirred, whey drawn off a portion at a time, cheese restirred, scalded with hot water and placed into molds or hoops. The process differs significantly with different cheese types but requires attention to detail at all times.

After the cheese is placed into molds, the molds are either pressed or turned frequently to remove additional whey for one to two hours. The cheese molds are then stored for seventeen to twenty hours either in cold water or cold storage before being emptied and the cheeses placed in brine for up to forty-eight hours for salting. After being removed from the brine, the cheeses are drained, packed in bags, placed on pallets in plastic or cardboard cases and moved into cold storage for fermentation and/or maturation. It was recommended that the Havarti cheeses be packed in cryovac bags and the Jarlsberg cheeses in bags of polyethylene-cellophane and heat welded.

The fermentation and maturation process for these cheese types is also very labor intensive. For example, the 45% Havarti cheese requires fermentation at 55° to 59° Fahrenheit for three weeks during which time the individual cheeses must be turned once. When moved to a maturation room at a temperature of 48° to 52° and subsequently to cold storage at 37° to 39°, the cheeses are again turned with those stacked on the bottom of the pallet moved to the top and visa versa.

The Jarlsberg cheese requires similar handling during storage. These cheeses are placed in the maturation room at 54° to 55° after forty-eight hours in brine for a period of two weeks during which time they must be turned and repiled four to five times. They are then moved into a fermentation room (70° to 73°) for four more weeks where they are turned once each week. Finally they are placed in cold storage (46° to 48°) for three weeks before being judged, labeled, and sold. The rhythm of maturing and the temperatures have an important influence on the eye-setting, flavor and texture of the cheese.

The production of either cheese type requires approximately 26 man-hours of labor daily as summarized in Table 3-2. In addition, supervision time of approximately two hours a day is allocated to the cheese making process resulting in a product with a relatively high labor cost of production.

TABLE 3-2

DAILY LABOR REQUIREMENTS FOR PRODUCTION OF

2183 lbs. (990 Kgs.) OF CHEESE DAILY

Type of Labor	45% Havarti	Jarlsberg
Dairyman (cheese maker)	8 hours	8 hours
Unskilled labor	12 hours	12 hours
Packing labor	5 hours	5 hours
Part time in laboratory	1 hour	1.5 hours
TOTAL	26 hours	26.5 hours

It is important to maintain strict quality control in the production of these cheeses, particularly at time of transferring the cheeses from the brine bath to the draining racks and the packaging room. This is necessary to avoid bacteriological and physical infections of the cheese. Also, during storage in the cold room it is important not to expose the cheeses to increasing temperatures which could introduce new productions of carbon dioxide and propionic acid bacteria.

The probable yield of raw milk for the production of 45% Havarti and Jarlsberg cheese was based on samples of milk gathered while conducting the technical study. Table 3-3 summarizes all of the raw materials including butter fat and skim milk required for the production of these cheese types. These ingredients are specified per pound of cheese produced.

TABLE 3-3

RAW MATERIALS REQUIRED FOR CHEESE TYPES
(Yield: One (1) lb.)

Ingredient	45% Havarti	Jarlsberg
Butterfat	.325 lbs.	.325 lbs.
Skim milk	9.515 lbs.	9.645 lbs.
Rennet	.003 lbs.	.003 lbs.
Salt	.030 lbs.	.025 lbs.
Starter-Cheddar	1.5 - 2.0%	1.3%
Starter-L. Helveticus and Propionic Acid		50ml/1001t. milk

During the course of the cheese making process, a significant amount of by-product or whey will result. It has been assumed in this study that the whey will be collected in a tank in the plant to be disposed of as livestock feed on near-by farms. This is consistant with the practices of most small cheese plants in the area. The value of the whey as a by-product, however, barely exceeds the cost of collecting and transporting to the farm. For this reason, no economic value is assigned to the whey in figuring the cost of production later in this report.

PRODUCTION AREA AND EQUIPMENT REQUIREMENTS

The Manor Dairy Ltd., technical study suggested an arrangement for the production premises and storage facilities associated with each of the two cheese types covered in this report. The greatest possible use was made of the existing plant space, storage facilities, and cheese making equipment at

the two plants involved in the technical study in order to keep total investment costs at a minimum. Table 3-4 summarizes the space requirements of the two products as broken down between various areas of a plant.

TABLE 3-4

SPACE REQUIREMENTS

(Square feet)

Area	45% Havarti	Jarlsberg
Cheese Room, making use of existing equipment	600	750
Additional area in Cheese Room for new equipment	175	---
Salting Room	108	120
Packing Area	65	65
Fermentation Room	390	280
Maturation Cold Storage	195	188
Buffer Cold Storage	195	188
TOTALS:	1,728 sq. ft.	1,591 sq. ft.

To a large extent, total space requirements were based upon an assumption of a continuous pattern of selling and producing the product throughout the year. It was recommended that the buffer cold storage area be the same size as the maturation room, allowing for storage of the product for up to two weeks after ready for shipment. Total space requirements for the production of 45% Havarti cheese and Jarlsberg cheese, including the necessary portion of existing cheese rooms, were 1,728 sq. ft. and 1,598 sq. ft. respectively.

Equipment requirements were developed after analyzing existing equipment at the plants studied for their suitability in the production of European cheeses. However, significant investments were recommended in special equipment specifically suited to such cheese production. These are summarized in Table 3-5 as developed in the technical study. Existing equipment in both plants was valued at 50% of new cost to reflect the contribution that such equipment would make to the production of the specialty cheese.

Although the space and equipment requirements for the production of these cheeses in existing cheese plants are minimum, a significant amount of money must be invested in the overall project in order to support the inventory of cheese in storage and provide working capital as well as provide for necessary production areas and equipment. Table 3-6 summarizes total investment requirements for the two cheese types.

Space requirements are broken into two catagories with storage areas which must be insulated and refrigerated separated from other production areas. Again, the necessary investment in space was assessed at 50% of new cost to reflect the fact that these cheeses would be produced in existing plants already engaged in the production of other cheeses or in the production of cottage cheese and other dairy products. A value of $65 per square foot was applied to the square footage of storage area as a new cost and a value of $35 per square foot was applied to all other space requirements to represent new or replacement values.

The single largest item in both investment budgets is represented by the large inventory of cheese in storage in various stages of ageing. The 45% Havarti cheese must be stored for approximately six weeks and will accumulate an inventory value of approximately $82,000. The Jarlsberg cheese must be stored for approximately nine weeks before being sold to accumulate an inventory value of approximately $123,000.

TABLE 3-5

MACHINERY AND EQUIPMENT REQUIREMENTS

List of Equipment	Cost Allocated to Production of: 45% Havarti	Jarlsberg
Existing Equipment (valued at 50% of new cost)		
Cheese vat (22,000 lb.)	$11,000	$11,000
Cheese curd pump	1,750	---
Cheese press	---	3,500
Whey pump	1,700	1,700
Whey tank	1,250	1,250
High pressure washer for cheese molds	4,300	4,300
Laboratory equipment "moisture, fat, PH"	5,000	5,000
Hydraulic pallet jack	400	400
Balances	600	600
SUB TOTAL:	$26,000	$27,750
New Equipment for Special Cheese Types		
Vibration sieve	$ 7,087	---
Whey filtering "Roto-Fluid Sieve"	7,962	$ 7,962
Alterations for hooping-pressing in vat	---	291
Measuring and cutting unit	---	544
Cheese molds - Perfora	5,600	5,250
Trolley tables - 3 pcs.	5,845	---
Starter tank - 1 pc.	1,708	1,708
Plastic fiber containers (Brine)	1,456	1,087
Draining racks - 2 pcs.	815	815
Transport pallets	3,573	1,106
Plastic cases for cheese storage	9,666	2,900
Cryovac plant	3,203	---
Contingencies	4,195	3,000
SUB TOTAL:	$51,110	$24,633
TOTAL	$77,110	$52,383

TABLE 3-6

TOTAL INVESTMENT REQUIREMENTS FOR
CHEESE PRODUCTION

ITEM	Investment Required for: 45% Havarti	Jarlsberg
Space Requirements:		
Cheese room, salting & packing	$ 16,590	$ 16,362
Storage (insulated & refrigerated)	25,350	21,320
Machinery & Equipment	77,110	52,383
Packaging materials and supplies inventory	2,000	1,800
Inventory of cheese in storage[1]	81,862	122,794
Working capital	60,000	60,000
TOTAL	$262,912	$274,659

[1]Forty-five percent Havarti cheese must be stored for approximately six weeks, a total of 65,490 lbs. valued at $1.25 per pound; Jarlsberg cheese must be stored for approximately nine weeks, a total of 98,235 lbs. valued at $1.25 per pound.

Working capital requirements for the production both cheese types are assumed to amount to $60,000 which is approximately the amount of money required to operate the plant for a one month period, covering all costs of production. Assuming that a continuous pattern of selling is established for these two cheeses, this should represent an adequate amount of working capital since inventories are already included at cost as part of total investment. The total investment requirements for the production of 45% Havarti cheese amounts to $262,912. For the production of Jarlsberg cheese, total investment requirements are budgeted at $274,659 as summarized in Table 3-6.

FINANCIAL ANALYSIS

As discussed in the Industry Analysis Section of this report, Havarti cheese and Jarlsberg cheese represent two of the larger volume European imported cheeses being marketed in the United States. At the time of writing this report, the export price for 45% rindless Havarti cheese in 11 pound (5 kg.) blocks was $1.34 per pound, CIF New York. The export price for Jarlsberg cheese in 33 pound (15 kb.) blocks was $1.38 per pound, CIF New York. West coast prices averaged 4 to 5 cents per pound higher than those quoted at New York.

It was demonstrated in the technical study that domestically produced European type cheeses will compete successfully with imports with respect to quality and can be marketed without the addition of import duties, local freight, customs clearance duties, and importer brokerage fees which are assessed on imports. Import duties for the two cheese types analyzed in this study amount to 10%. Customs clearance duties amount to 2-3%. Local frieght varies with distances to market from U.S. ports, but also contributes significantly to the cost of transporting cheese into the Pacific Northwest. Finally, profits of the importer add to the cost of the product over and above import duties and other fees.

In evaluating the economic feasibility of producing these speciality cheese types in Montana, a set of conservative prices were selected to reflect the minimum price which must be negotiated with food brokers for placement of the product within existing marketing channels. Efforts to develop direct wholesale or retail markets could reward the producer with

a much higher return if allowed under the licensing or contract arrangements with a European cheese firm. Table 4-1 summarizes the manner in which the conservative prices were obtained, starting with CIF prices in New York.

TABLE 4-1

MINIMUM SELLING PRICES FOR SPECIALTY CHEESE TYPES
(FOB Montana)

	45% Havarti (per pound)	Jarlsberg (per pound)
CIF New York:	$1.34	$1.38
ADD: Import Duties (10%)	.13	.14
Clearance Duties (2-3%)	.03	.03
Freight into Northwest (Montana)	.03	.03
Importer Fees	.13	.13
TOTAL	$1.66	$1.71

As pointed out in the technical study, a significant amount of value can be added to the production of cheese if the larger blocks are cut and packed in small portions suitable for consumer purchases. In addition, the possibility of developing markets expands as direct delivery to supermarkets and retailers in the Pacific Northwest becomes possible. Although the scope of this study has not been to analyze such distribution channels, the possibility is suggested here for the purpose of encouraging any cheese plant undertaking to produce these cheeses to evaluate this alternative.

The primary market area for specialty cheeses produced in Montana encompasses the states and major cities within a thousand mile distance of south central Montana. This includes North Dakota, South Dakota, and

to the East; Wyoming, Colorado, Utah and Idaho to the South; and Washington and Oregon to the West. A secondary market area would include the West coast areas of California as well as portions of the North Central region of the country. Depending upon sales growth, production volume and availability of raw milk supplies, this secondary market area may become as significant as the primary market area. Freight cost to transport cheese into the primary market area will range between $.03 and $.04 per pound considering the scale of operations proposed.

COST OF PRODUCTION

Raw materials, labor and direct plant overhead costs represent the variable or unit costs of producing the two cheese types analyzed in this study. Labor requirements were summarized in Table 3-2 based on the production of one vat of cheese (2,183 lbs.) per day. Raw materials required per pound of finished product were summarized in Table 3-3. Direct plant overhead will include management salaries, cleaning materials and effluent treatment costs, utilities, repair and maintenance costs, and depreciation on buildings and equipment.

In calculating raw milk costs, it is necessary to determine separate values for butterfat and skim milk content of the raw milk used in the process. Normally, raw milk is available for the production of cheese only during "surplus" periods of the year when demand for fluid milk products, ice cream, and cottage cheese is insufficient to utilize the available milk supply. In order to acquire milk on a year-round basis for the production of fine quality cheese it will be necessary to pay a price significantly higher than the Class III price for raw milk during part, if not all, of the year. In all likelihood, the price paid for raw milk

will be a negotiated matter between the cheese plants requiring milk and those dairy farmers or others who contract to supply milk to the facility.

For the purpose of budgeting raw milk costs in this study, a pricing formula was utilized to calculate a weighted average (blend) price for skim milk and butterfat. This price represents the average price being received by Montana dairy farmers for milk supplied to milk plants in the state as affected by utilization within Classes I, II and III. Statewide, utilization percentages between these classes has varied between market areas as well as within a given market area over a year's period. Currently, utilization of milk within the state would indicate that approximately 72% is used within Class I, 16% within Class II, and 12% within Class III.

Table 4-2 summarizes the pricing formula used in calculating the weighted average price of both skim milk and butterfat using the above mentioned percentages and prices as posted in March of 1979 within the state. The skim milk value using this formula amounts to $.0838 per pound; the butterfat value amounts to $.86 per pound. For milk testing 3.5% butterfat, the "blend" price is approximately $11.10 per hundredweight (cwt).

Tables 4-3 and 4-4 summarize the production cost of 45% Havarti cheese and Jarlsberg cheese respectively. Each can be produced for approximately $1.26 per pound. In both instances, raw milk costs account for approximately 86% of total costs. Labor costs account for another significant portion of production costs since the manufacture of these two cheese types is relatively labor intensive.

Production costs of these European type cheeses are significantly higher than the production cost of cheddar cheese typically produced in

cheese plants in the Pacific Northwest. This results primarily from the fact that the raw milk cost used in these calculations is considerably higher than the raw milk cost normally allocated to the production of cheddar cheese (classified in the State of Montana as Class III). However, when compared with projected wholesale market prices of $1.66 to $1.71 per pound, the production cost of approximately $1.26 per pound appears reasonable. The projected gross profit associated with these cheese types amounts to $.40 per pound for 45% Havarti cheese and $.45 per pound for Jarlsberg.

TABLE 4-2

SUGGESTED PRICING FORMULA FOR CALCULATING A WEIGHTED AVERAGE (BLEND) PRICE OF RAW MILK
(March 1979 - State of Montana Prices)

Class	$/cwt	Percentage Utilization (estimated)	Skim Value ($ per lb)	Butterfat Value
Class I	11.71	72%	$.094145	$ .75
Class II	10.17	16%	.06005	1.25
Class III	8.66	12%	.05340	1.00

"Blend" Price Calculation

Skim Milk		Butterfat	
72% x $.094145	= $.06778	72% x $.75	= $.54
16% x $.06005	= $.00961	16% x $1.25	= $.20
12% x $.05340	= $.00641	12% x $1.00	= $.12
Weighted Average	= $.08380/lb.	Weighted Average	= $.86/lb.

"Blend" Price of Milk Testing 3.5% B.F.

3.5 x $.8600	= $ 3.0100
96.5 x $.0838	= $ 8.0867
TOTAL	$11.0967/cwt

TABLE 4-3

PRODUCTION COST OF 45% HAVARTI CHEESE

(545,600 lbs/yr)

ITEM			Dollars per lb.
Raw Milk Cost			
0.325 lbs. butterfat @ $.8600:			$ .2795
9.515 lbs. skim milk @ $.0838:			.7974
		Sub Total:	$1.0769
Other Raw Product and Unit Costs			
Rennet: .003 lbs. @ $.71/lb.			$ .0021
Salt: .030 lbs. @ $.032/lb.			.0010
Starter: $30 per Vat (2182 lbs.)			.0137
Packing Materials: .2905/11 lb. bag			.0264
		Sub Total:	$ .0432
Labor Costs			
Dairyman	8 hr/day @	$9.00/hr.	$ .0330
Unskilled labor	12 hr/day @	6.00/hr.	.0330
Packing labor	5 hr/day @	6.00/hr.	.0137
Laboratory	1 hr/day @	8.00/hr.	.0037
		Sub Total:	$ .0834
Direct Plant Overhead			
Management/Supervision ($560/month)			$ .0123
Cleaning materials & affluent treatment ($250/month)			.0055
Oil/gas and electricity ($305/month)			.0067
Water ($420/month)			.0092
Repair and maintenance ($250/month)			.0055
Depreciation-machinery & equipment (10 yrs, straight line - $7711/yr)			.0141
Depreciation-buildings (20 yrs, straight line - $2097/yr)			.0038
		Sub Total:	$ .0571
		Cost of Sales Total	$1.2606/lb.

TABLE 4-4

PRODUCTION COST OF JARLSBERG CHEESE

(545,600 lbs/yr)

ITEM		Dollars per lb.
Raw Milk Cost		
0.325 lb. butterfat @ $.8600		$ .2795
9.645 lb. skim milk @ $.0838		.8083
	Sub Total:	$1.0878
Other Raw Product and Unit Costs		
Rennet: .003 lbs. @ $.71/lb.		$ .0021
Salt: .025 lbs. @ $.032/lb.		.0008
Starter: $50 per Vat (2182 lbs.)		.0229
Packing Materials: $.43/33 lb. block		.0130
	Sub Total:	$ .0388
Labor Costs		
Dairyman	8 hr/day @ $9.00/hr.	$ .0330
Unskilled Labor	12 hr/day @ $6.00/hr.	.0330
Packing Labor	5 hr/day @ $6.00/hr.	.0137
Laboratory	1.5 hr/day @ $8.00/hr.	.0055
	Sub Total:	$ .0852
Direct Plant Overhead		
Management/Supervision ($560/month)		$ .0123
Cleaning Materials & Affluent treatment ($250/month)		.0055
Oil/gas & electricity ($355/month)		.0078
Water ($470/month)		.0103
Repair & maintenance ($250/mo)		.0055
Depreciation-machinery & equipment (10 yrs, straight line - $5238/yr)		.0096
Depreciation-buildings (20 yrs, straight line - $1884/yr)		.0035
	Sub Total:	$ .0545
Cost of Sales Total		$1.2663/lb.

Some items of expense have necessarily been omitted from these cost calculations since the production of these cheese types has been analyzed under the assumption that it would occur within an existing cheese plant or an existing milk plant with suitable production premises and equipment. General and administrative expenses, for example, are not covered in the $1.26 to $1.27 cost per pound calculation. Also, any licensing cost associated with acquiring the technology to produce these European type cheeses is not included since the terms and conditions of such licensing agreements are subject to negotiation. The $.40 to $.45 per pound "gross profit" amount must be adequate to pay for such licensing agreements, pay for a portion of plant general and administrative expenses, and provide an adequate return on investment if the venture is to be judged feasible.

To further analyze the financial feasibility of the production of these cheese types, the general and administrative expenses incurred by an existing plant and allocated to the production of these products must be considered. The necessary expenses will include the following:

Plant management and office salaries

Secretarial wages

Payroll taxes and employee benefits

Office supplies and postage

Telephone expense

Travel expense

Legal and accounting fees

Property taxes

It is estimated that the share of such expenses within an existing plant which must be borne by the production of a special European cheese could amount to as much as $.04 per pound.

A licensing agreement for the manufacture of these cheese types is expected to be structured in a manner similar to franchises where technology or know-how is transferred to the licensee or franchisee. It is anticipated that a licensing arrangement will be developed to specify a license fee based upon production, paid as a fixed percentage of production costs or as a percentage of net sales revenues. If the latter is negotiated, it is expected that the license fee will range between 3% and 5% of net sales, similar to common franchise arrangements.

PRO FORMA INCOME STATEMENTS

The following two pages contain pro forma income statements for the production and sale of the two cheese types analyzed in this report. Net sales are calculated after an allowance for discounts, merchandise returns and other sales credits assumed to approximate 3% of sales. Cost of sales are calculated using the data contained in Tables 4-3 and 4-4. Licensing agreements represent the one exception and are specified in the pro forma statement as 4% of net sales. Cost of sales represents between 80.3% and 82.3% of sales resulting in gross profit margins of 17.7% for 45% Havarti cheese and 19.7% for Jarlsberg cheese.

Operating expenses are budgeted in the pro forma statements at an estimated share of general and administrative expenses plantwide of $22,500 or approximately 2.5% of net sales revenues. Operating profit is projected for 45% Havarti cheese as $133,308 annually and for Jarlsberg cheese as $155,395 annually.

Pro Forma Income Statement

45% Havarti Cheese

SALES		
545,600 lbs. @ $1.66/lb.	$905,696	
Less discounts, returns, etc. (3%)	(27,171)	
NET SALES	$878,525	100.0%
COST OF SALES		
Raw milk @ $1.0769/lb.	$587,557	
Other raw materials @ $.0168/lb.	9,166	
Packaging materials @ $.0264/lb.	14,404	
Labor costs @ $.0834/lb.	45,503	
Direct plant overhead @ $.0571/lb.	31,154	
Licensing agreement (4% of net sales)	34,933	
TOTAL COST OF SALES	$722,717	82.3%
GROSS PROFIT	$155,808	17.7%
Operating Expenses		
Estimated share of general and administrative expenses in plant	$ 22,500	2.6%
Operating Profit*	$133,308	15.1%

*Available for debt service, income taxes and return on investment.

Pro Forma Income Statement

Jarlsberg Cheese

SALES		
545,600 lbs. @ $1.71/lb.	$932,976	
Less discounts, returns, etc. (3%)	(27,989)	
NET SALES	$904,987	100.0%
COST OF SALES		
Raw milk @ $1,0878/lb.	$593,504	
Other raw materials @ $.0258/lb.	14,076	
Packaging materials @ $.0130/lb.	7,093	
Labor costs @ $.0852/lb.	46,485	
Direct plant overhead @ $.0545/lb.	29,735	
Licensing agreement (4% of net sales)	36,199	
TOTAL COST OF SALES	$727,092	80.3%
GROSS PROFIT	$177,895	19.7%
Operating Expenses		
Estimates share of general and administrative expenses in plant	$ 22,500	2.5%
Operating Profit*	$155,395	17.2%

*Available for debt service, income taxes and return on investment.

It is important to point out that operating profit must be sufficient to cover interest expenses and income taxes and provide a return on investment. Interest and taxes will vary from location to location depending upon methods of financing and the marginal income tax rate for a particular plant. It has been assumed throughout this study that the production of these specialty cheeses would be undertaken in addition to other profitable operations within a plant having suitable production space and equipment. Therefore, the "marginal" income tax rate, or that rate on the last dollars of profit earned by the company, must be used in assessing the impact of federal and state taxes on the profitability of this venture. In all likelihood, the "marginal" federal tax rate will be 48%. The "marginal" tax rate in the State of Montana will be approximately 7% of operating profit less interest expenses.

The after tax profit potential of this enterprise is substantially reduced from the operating profit figures contained in the pro forma income statements. If it is assumed that total investment in equipment, inventory and other items to support cheese production is made with equity funds, the marginal income tax rate will reduce profits to an after tax level of approximately 45% of operating profits (federal taxes of 48% plus state taxes of 7% result in an effective tax rate of 55%). Potential return on investment from these cheese types within such an existing facility are summarized in Table 4-5 below.

The return on investment resulting from the production of various cheese types considered in this report ranges between 23 and 25% of total investment, assuming that the entire investment is funded with equity money. To the extent that a significant portion of the investment can be funded with borrowed money at a lower rate of interest, the potential return on equity is leveraged to a rate higher than 23-25%.

TABLE 4-5

POTENTIAL RETURN ON INVESTMENT BY CHEESE TYPE

	45% Havarti Cheese	Jarlsberg Cheese
Operating Profit	$133,308	$155,395
Less Federal and State Taxes (55%)	73,319	85,467
After Tax Profit	$ 59,989	$ 69,928
Total Investment	$262,912	$274,659
Return on Investment		
Net Profit/Total Investment	22.8%	25.5%
Payback Period	4.4 years	3.9 years.

In assessing the probable rate of return for a specific operation, it would be necessary to evaluate alternative financing plans, specify the firms "marginal" federal and state income tax rate, and develop precise estimates of the amount of general and administrative expenses which must be borne by the production of this type of cheese. In some situations, the profit potential of this venture may exceed that outlined in this report; in others, it may fall short of these projections. The purpose of this section of the report has been to outline a methodology that can be followed in evaluating the profitability of the venture in a particular location.

CONCLUSIONS AND RECOMMENDATIONS

The concept of producing European type specialty cheese in the United States is the result of economic forces which effect production and exporting costs of European cheese now marketed in the United States. Stimulated by high labor and overhead costs, raw milk costs, and import duties, European cheese makers have expressed an interest in locating suitable production facilities in the United States closer to markets for their products. In addition, freight costs and currency exchange rates are known to effect profits of European cheese firms to a significant degree, further stimulating those firms in their search for an economically feasible alternative to the continued production and exportation of cheese from Europe to satisfy demand in the United States.

A long run trend has developed toward increased production and consumption of cheese in the United States to include the European specialty cheeses now being marketed in specialty cheese shops and delicatessens. Many European cheese firms already have established markets through such outlets in the U.S. for their European production. These markets, however, might be satisfied by the production and distribution of European type cheeses from a U.S. based production facility, It has been demonstrated in this study that an adequate supply of milk does exist in selected areas in the State of Montana suitable to the production of two types of European cheese. Furthermore, it has been demonstrated that existing facilities can be utilized to produce these cheese types with some modification of the premises and equipment contained therein.

The key factors regarding the economic feasibility of the production of European type cheeses in the Old West Region, apart from milk supply, are production costs, selling prices of finished products and location relative to markets. While the cost of producing specialty cheeses is relatively high (approximately $1.26 per pound) an ample margin of profit does exist which would afford a satisfactory return on investment to someone undertaking such production. The production costs specified in this study are largely the result of high raw milk costs which must be paid in order to acquire raw milk supplies on a year-round basis. Also, the various European type cheeses require intense labor and quality control in their production.

It is important to note that the overall cost of producing such cheeses has been minimized due to the utilization of existing equipment and production facilities. The production of any specialty cheese would most likely be unfeasible if it were to be produced in a new facility devoted exclusively to one product line. Undertaking the production of these cheese types within an existing facility, as demonstrated in this study, is feasible to the extent that satisfactory licensing or contract agreements can be negotiated with a European cheese firm which can utilize the production volume evaluated in this report and in the technical feasibility studies.

The financial analysis section of this report has outlined a methodology which can be applied by owners of cheese plants anywhere within the Old West Region, adjusting various costs and prices to local conditions. The production cost in this report of $1.26 per pound might vary from one location to another due to raw milk costs, labor costs, and overhead costs. Specific production costs will be affected by negotiations

between those producing the cheese and dairy farmers and others selling raw milk for this purpose. In a similar manner, the selling price of finished products will be the result of negotiations between the producer and food brokers or others who place the product within existing distribution channels at competitive prices. As noted in the study, it may be necessary to cut and package some of the production output in smaller portions suitable for consumer purchases in order to satisfy existing markets and command a premium price over that which can be acquired from marketing the product in bulk quantities.

Location relative to markets is always a factor in the economic feasibility of any business venture, primarily due to transportation costs. However, the feasibility of successfully producing European type cheeses depends most upon an adequate supply of "quality" raw milk from which the specialty cheese evaluated in this study can be produced. The technical study has demonstrated that such milk is available in Montana. Distribution costs to markets one thousand miles distant will add only a fraction of cost (2% to 3%) to the finished product and not limit marketability of the items. Furthermore, existing marketing channels, accustomed to paying for and handling imported cheese, are to be used in the distribution of cheese produced in Montana.

Based on the analysis conducted in this study and summarized in this report, it is recommended that efforts be put forth to encourage the development of a satisfactory licensing agreement between a foreign cheese firm and one or several existing cheese plants within the State of Montana to produce the specialty cheese types evaluated in this and the technical feasibility study. Several items must be negotiated to the mutual satisfaction of both parties. These include: (1) a licensing

agreement which includes the transfer of the necessary technical know-how for the production of 45% Havarti cheese or Jarlsberg cheese as well as the terms and conditions binding both parties in the production process, (2) a license fee based on production or sales volume, (3) a sales agreement regarding price and distribution of products within existing marketing channels, and (4) sales rights concerning the distribution of the product within wholesale or retail outlets, possibly after cutting and wrapping the cheese in smaller portions.

Another factor which must be considered in implementing the results of this study is the negotiation of contractual agreements between cheese plants and dairy farmers supplying raw milk in order to guarantee a year-round supply of milk suited to the production of specialty European cheeses. Adequate economic incentives do exist for local cheese plants and European cheese firms to implement the production of specialty cheese within Montana as demonstrated in this and the technical feasibility studies.

APPENDIX A

FLEXIBLE ECONOMIC FORMULAS FOR CLASS I, II, AND III PRODUCER MILK PRICES, STATE OF MONTANA

TABLE A-1

FORMULA FOR FIXING CLASS I PRICE

AT THE PRODUCER LEVEL

LEVEL.

The minimum prices which shall be paid to producers by distributors in all market areas of the State shall be calculated by either applying the flexible economic formula described below or the Minnesota-Wisconsin Series plus three dollars ($3.00) whichever price is lower. The flexible economic formula utilizes a November, 1969 Base equalling 100, an interval of 4.5 and consists of seven (7) factors. The factors and their assigned weights are as follows:

	FACTOR	WEIGHT	CONVERSION FACTOR
(1)	Unemployment U.S. (6.67 (3.8 - C) + 100) .05	5%	
(2)	Unemployment MT. (6.67 (6.1 - C) + 100) .10	10%	
(3)	Weekly Wages - Total Private (Revised and seasonally adjusted)	15%	.13297873
(4)	Prices Received by Farmers - MT ('47 - '49 = 100)	15%	.15789474
(5)	Mixed Dairy Feed	20%	.32258065
(6)	Alfalfa Hay	12%	.48000000
(7)	Prices Paid by Farmers - U.S. ('67 = 100)	23%	.20720721

NOTE: The reported revised weekly wage - total private is seasonally adjusted by dividing each months revised figures by the following factors: Jan.-.9770; Feb.-.9760; March-.9795; April-.9838; May-.9934; June-1.0067; July-1.0292; August-1.0274; Sept.-1.0221; Oct.-1.0135; Nov.-1.0027; Dec.-.9887.

The following Table will be used in computing producer prices:

TABLE 1

Producer Price Determination Using above Formula with November, 1969 = 100 and an Interval = 4.5

FORMULA INDEX	PRICE PER CWT
143.0 - 146.6	$ 9.18
147.5 - 151.1	9.41
152.0 - 155.6	9.64
156.5 - 160.1	9.87
161.0 - 164.6	10.10
165.5 - 169.1	10.33
170.0 - 173.6	10.56
174.5 - 178.1	10.79
179.0 - 182.6	11.02
183.5 - 187.1	11.25
188.0 - 191.6	11.48
192.5 - 196.1	11.71
197.0 - 200.6	11.94
201.5 - 205.1	12.17
206.0 - 209.6	12.40
210.5 - 214.1	12.63

TABLE A-2

FORMULA FOR FIXING CLASS II PRICE TO BE PAID TO PRODUCERS

Prices paid producers for Class II milk will be the average spray process nonfat dry milk solids price per pound, f.o.b. Chicago area, as most recently reported by the United States Department of Agriculture, multiplied by 8.2 (which is the amount of solids not fat in skim milk), plus the average Chicago area butter price (Grade A, 92 Score), as most recently reported by the United States Department of Agriculture, multiplied by 4.2 (which is the amount of butter in pounds, which can be produced from one hundred pounds of three point five percent (3.5%) milk), less a make allowance of eight and one half percent (8.5%).

In the case of milk containing more or less than three point five percent (3.5%) butterfat, the differential to be employed in computing prices will be determined by multiplying the above-mentioned Chicago area butter price by .111 and the resulting answer from this calculation shall be rounded to nearest half cent ($0.005).

SOURCE: Pricing Rules, Board of Milk Control, Rule 8-3.14(14)-S1440, ordered July 24, 1976.

TABLE A-3

FORMULA FOR FIXING THE CLASS III PRICE TO BE PAID TO PRODUCERS

Prices paid to producers for Class III milk will be the average Chicago area butter price (Grade A, 92 Score) as most recently reported by the United States Department of Agriculture, less ten percent (10%) and, in addition, when skim milk is utilized in this classification by any distributor, the average spray process non-fat milk solids price per pound, f.o.b. the Chicago area, as most recently reported by the United States Department of Agriculture, multiplied by 8.2, less seventeen percent (17%).

SOURCE: Pricing Rules, Board of Milk Control, Rule 8-3.14(14)-S1440, ordered July 24, 1976.

TABLE A-4

ILLUSTRATIONS OF CLASS II AND CLASS III
PRICE CALCULATIONS, MARCH 1979

CLASS II PRICE FOR MILK TESTING 3.5% . . . . . = /$10.17 / CWT /

Average spray process dry milk solids price per pound	$0.78517		
Multiplied by 8.2	x 8.2		
	$6.43839		$ 6.43839
Plus			
Average Grade A, 92 Score butter price per pound	$1.11300		
Multiplied by 4.2	x 4.2		
	$4.67460	+	$ 4.67460
			11.11299
Less 8.5% ($11.11299 x .085)			- .94460
			$10.16839
Rounded to nearest whole cent	=		$10.17 per cwt

CLASS III BUTTERFAT PRICE PER POUND . . . . . = /$ 1.00 / Lb /

Average Grade A, 92 Score butter price per pound	=	$ 1.11300
Less 10%		-.11130
		$ 1.00170
Rounded to nearest whole cent	=	$ 1.00 per Lb

CLASS III PRICE PER CWT FOR SKIM MILK UTILIZED . . . . . = /$5.34 / CWT /

Average spray process dry milk solids price per pound	=	$ 0.78517
Multiplied by 8.2		x 8.2
		$ 6.43839
Less 17% ($6.43848 x .17)		-1.09453
		$ 5.34386
Rounded to nearest whole cent	=	$5.34 per cwt

CLASS III PRICE PER CWT FOR MILK TESTING 3.5% . . . . . = /$8.66 / CWT /

3.5# butterfat x $1.00 per lb.	=	$ 3.500
96.5# skim x $0.05344 per lb.	=	5.157
		$ 8.657 per cwt

APPENDIX B

SELECTED STATISTICS FOR MILK PRODUCTION AND UTILIZATION IN MONTANA

TABLE B-1
MONTANA PRODUCER MILK PRICES
1971 - MARCH 1979

Date	Class I Price	Class II Price	Class III Price
	Dollars per Hundredweight		
Jan 1971	$ 6.35	NA	NA
May 1972	6.78	NA	NA
Feb 1973	7.34	$ 5.67	$ 4.24
May 1973	7.76	5.83	4.24
Independent Formula Established for Producers			
Oct 1973	8.03	6.76	5.05
Dec 1973	8.95	7.09	5.30
Feb 1974	8.95	6.73	4.97
Mar 1974	9.41	6.80	5.03
Apr 1974	9.41	6.90	5.07
Class II Formula Revised May 1974			
June 1974	9.87	8.43	5.64
Aug 1974	9.64	7.31	4.92
Oct 1974	9.41	7.54	5.06
Dec 1974	9.41	7.61	5.13
Mar 1975	9.65	7.71	5.17
Apr 1975	9.41	7.80	5.23
June 1975	9.41	7.84	5.21
July 1975	9.64	7.86	5.27
Aug 1975	9.41	7.89	5.30
Sept 1975	9.41	8.21	5.56
Oct 1975	9.41	8.61	5.83
Nov 1975	9.41	9.23	6.24
Dec 1975	9.64	9.77	6.62
Jan 1976	9.64	10.05	6.82
Feb 1976	9.64	9.36	6.94
Mar 1976	9.64	8.27	6.13
Apr 1976	9.64	7.95	5.87
May 1976	9.64	8.14	6.04
June 1976	9.87	8.22	6.11
July 1976	9.87	8.22	6.10
Aug 1976	9.87	8.40	6.26

TABLE B-1 (CONTINUED)

Date	Class I Price	Class II Price	Class III Price
Class I and Class III Formulas Revised	Dollars per Hundredweight		
Sept 1976	$10.33	$ 8.81	$ 7.48
Oct 1976	10.10	8.83	7.51
Nov 1976	10.33	8.30	7.06
Dec 1976	10.33	8.24	7.02
Jan 1977	10.33	8.23	7.02
Feb 1977	10.33	8.23	7.02
Mar 1977	10.56	8.23	7.02
Apr 1977	10.56	8.23	7.02
May 1977	10.79	8.39	7.13
June 1977	10.79	9.04	7.71
July 1977	10.56	9.04	7.71
Aug 1977	10.56	9.04	7.71
Sept 1977	10.56	9.04	7.71
Oct 1977	10.56	9.04	7.71
Nov 1977	10.56	9.04	7.71
Dec 1977	10.56	9.04	7.71
Jan 1978	10.56	9.05	7.71
Feb 1978	10.56	9.08	7.74
Mar 1978	11.02	9.04	7.71
Apr 1978	11.02	9.04	7.71
May 1978	11.71	9.11	7.74
June 1978	11.71	9.42	8.01
July 1978	11.48	9.49	8.08
Aug 1978	11.25	9.49	8.08
Sept 1978	11.25	9.56	8.15
Oct 1978	11.25	9.94	8.45
Nov 1978	11.25	9.94	8.45
Dec 1978	11.25	10.09	8.59
Jan 1979	11.02	10.41	8.85
Feb 1979	11.48	10.43	8.87
Mar 1979	11.71	10.17	8.66

TABLE B-2

MILK PRODUCTION IN MONTANA

BY MARKET AREA

1970-1977

MARKET AREA	(Production: 1000 lbs) 1977	1976	1975	1974	1973	1972	1971	1970
Kalispell	19,502	19,596	18,484	19,305	21,432	20,197	18,845	18,342
Missoula	59,307	54,062	54,129	50,340	54,805	57,760	54,079	51,646
Butte	18,285	17,254	18,081	16,137	17,869	16,291	15,270	14,274
Great Falls	36,841	36,049	34,234	34,887	30,772	30,327	29,890	29,849
Helena	6,299	5,763	5,798	4,455	5,910	5,394	5,461	5,326
Havre	10,740	10,616	9,639	10,329	10,564	10,018	10,143	10,120
Bozeman	44,223	39,028	37,784	37,701	44,381	54,610	53,043	51,456
Billings	40,498	35,342	34,799	33,992	30,658	25,206	25,602	25,002
Glendive*	8,691	8,925	9,148	8,491	8,596	8,989	9,475	9,279
TOTAL	244,386	226,636	222,095	215,637	224,987	228,791	221,806	215,295

* Glendive area includes Miles City prior to 1977
and Plentywood prior to 1973.

Source: A recap of Milk Utilization in Montana,
Annual Report, Milk Control Division,
Montana Department of Business Regulation.

TABLE B-3

MARKET SHARE OF MILK

PRODUCTION IN MONTANA

1970-1977

MARKET AREA	Percent of Total Market							
	1977	1976	1975	1974	1973	1972	1971	1970
Kalispell	8.0%	8.6%	8.3%	8.9%	9.5%	8.8%	8.5%	8.5%
Missoula	24.3	23.8	24.3	23.3	24.3	25.2	24.4	24.0
Butte	7.5	7.6	8.1	7.5	7.9	7.1	6.9	6.6
Great Falls	15.1	15.9	15.4	16.2	13.7	13.3	13.5	13.9
Helena	2.6	2.5	2.6	2.1	2.6	2.4	2.5	2.5
Havre	4.4	4.7	4.3	4.8	4.7	4.4	4.6	4.7
Bozeman	18.1	17.2	17.0	17.5	19.7	23.9	23.9	23.9
Billings	16.6	15.6	15.7	15.8	13.6	11.0	11.5	11.6
Glendive*	3.4	4.1	4.3	3.9	4.0	3.9	4.2	4.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Glendive area includes Miles City prior to 1977
and Plentywood prior to 1973.

Source: A recap of Milk Utilization in Montana,
Annual Report, Milk Control Division,
Montana Department of Business Regulation.

TABLE B-4

MILK USED IN CLASS I & CLASS III

BY MARKET AREA IN MONTANA

1970-1977

MARKET AREA	(Class I Percentage/Class III Percentage) 1977	1976	1975	1974	1973	1972	1971	1970
Kalispell	79.4% / 11.8%	74.7% / 16.2%	75.6% / 15.2%	67.3% / 17.5%	64.9% / 20.6%	70.8% / 15.3%	70.9% / 14.7%	70.5% / NA
Missoula	61.5 / 14.0	64.9 / 11.7	64.2 / 11.6	60.1 / 15.0	61.9 / 11.8	63.4 / 10.7	64.8 / 9.3	63.7 / NA
Butte	93.3 / 6.3	95.8 / 4.0	93.4 / 1.8	96.8 / .8	80.6 / .8	73.0 / 1.3	66.7 / 2.2	65.0 / NA
Great Falls	74.0 / 15.6	76.8 / 12.3	80.3 / 8.6	81.6 / 8.2	87.9 / 2.9	86.6 / 4.0	86.0 / 4.8	86.6 / NA
Helena	77.8 / 2.1	81.4 / 2.1	85.5 / 1.8	78.5 / 2.8	79.0 / 3.3	82.6 / 4.6	81.2 / 6.6	80.1 / NA
Havre	85.2 / 3.8	85.8 / 3.5	86.1 / 4.0	83.5 / 4.3	84.0 / 4.0	85.8 / 2.8	86.3 / 2.8	84.8 / NA
Bozeman	71.6 / 14.1	78.1 / 7.1	75.3 / 12.1	69.7 / 18.4	65.1 / 19.1	63.0 / 23.4	64.3 / 24.1	61.6 / NA
Billings	84.9 / 11.1	91.5 / 5.1	89.2 / 5.5	83.2 / 9.1	80.4 / 11.7	83.2 / 5.9	78.5 / 8.0	79.8 / NA
Glendive*	70.9 / 20.9	69.7 / 21.6	72.3 / 18.3	78.6 / 11.9	84.2 / 6.4	86.0 / 5.4	85.6 / 7.0	87.1 / NA
State-of-Montana Total	74.7% / 12.6%	78.0% / 9.5%	77.7% / 9.5%	74.7% / 11.8%	72.7% / 11.2%	72.2% / 11.3%	72.1% / 11.7%	72.0% / NA

* Glendive area includes Miles City prior to 1977
and Plentywood prior to 1973.

Source: A recap of Milk Utilization in Montana,
Annual Report, Milk Control Division,
Montana Department of Business Regulation.

TABLE B-5

CLASS III MILK UTILIZATION

BY MARKET AREA IN MONTANA

1970-1977

MARKET AREA	(Production: 1000 lbs) 1977	1976	1975	1974	1973	1972	1971	1970
Kalispell	2,295	3,165	2,802	3,371	4,411	3,085	2,763	N.A
Missoula	8,296	6,304	6,292	7,559	6,468	6,178	5,306	N.A
Butte	1,150	684	345	137	148	218	337	N.A
Great Falls	5,757	4,439	2,931	2,845	879	1,205	1,424	N.A
Helena	135	119	107	124	193	247	358	N.A
Havre	411	376	383	441	419	277	286	N.A
Bozeman	6,385	2,754	4,562	6,950	8,492	12,770	12,757	N.A
Billings	4,496	1,805	1,911	3,088	3,592	1,485	2,038	N.A
Glendive*	1,820	1,926	1,678	1,011	554	485	170	N.A
TOTAL	30,745	21,572	21,013	25,524	25,157	25,949	25,929	N.A

* Glendive area includes Miles City prior to 1977 and Plentywood prior to 1973.

Source: A recap of Milk Utilization in Montana, Annual Report, Milk Control Division, Montana Department of Business Regulation.

TABLE B-6

AVERAGE BLEND PRICE PAID FOR

MILK BY MARKET AREA IN MONTANA

1970-1977

MARKET AREA	(Price Per Hundred-weight) 1977	1976	1975	1974	1973	1972	1971	1970
Kalispell	$10.20	$ 9.37	$ 8.65	$ 8.23	$ 6.76	$ 5.99	$ 5.81	$ 5.70
Missoula	9.76	9.25	8.35	8.20	6.81	5.83	5.65	5.46
Butte	10.56	9.88	9.45	9.41	7.46	6.35	6.04	5.88
Great Falls	10.20	9.57	9.13	8.84	7.63	6.51	6.32	6.27
Helena	10.49	10.04	9.46	8.90	7.37	6.37	6.24	6.07
Havre	10.29	9.71	9.23	8.93	7.48	6.44	6.32	6.20
Bozeman	10.09	9.61	8.70	8.26	6.62	5.65	5.35	5.19
Billings	10.42	10.04	9.37	8.86	7.36	6.41	5.99	5.99
Glendive*	9.86	9.34	8.85	8.70	7.27	6.27	6.00	6.02
State-of-Montana Average	$10.14	$ 9.58	$ 8.88	$ 8.58	$ 7.07	$ 6.05	$ 5.81	$ 5.69

* Glendive area includes Miles City prior to 1977
and Plentywood prior to 1973.

Source: A recap of Milk Utilization in Montana,
Annual Report, Milk Control Division,
Montana Department of Business Regulation.